Wallops Command & Data Acquisition Station
Intermediate Frequency Distribution Switch System
Statement of Work dated 04/16/09

1. Introduction

The GOES R Backup (RBU) facility will service all of the GOES R series spacecraft. These spacecraft will be considered National assets to the U.S. government and will be deemed critical to this Nations ability to protect its citizens and commerce from weather related events. The data gathered from these spacecraft will be used to forecast weather, provide input to numeric weather models, track/forecast severe storms such as hurricane and tornados, and provide input to climate prediction models. These spacecraft will provide data to the station 24/7 and therefore ground system down time is not permitted.

One RBU ground subsystem that is essential to the data flow of the entire geostationary ground system is the Intermediate Frequency Distribution System (IFDS). The IFDS L, S (45 – 95 MHz) & X (1.0 – 1.4 GHz) band IF (45 – 95 MHz) switching system provides all uplink and downlink signals to the GOES R Weather Satellites. The IFDS is the SINGLE interface for all IF communications and therefore system failures must approach zero. Failure of this GOES subsystem results in the loss of ALL Radio Frequency (RF) communications with the GOES R series spacecraft and will result in lost images from both the East & West Coast spacecraft and could result in possible spacecraft damage.

This document shall define the GOES R matrix switching requirements with respect to L/S & X-Band switching. The sizing of each GOES R ground system's site is defined as follows;

- Wallops
  - Upgrade current L/S-Band Receive matrix from 48X96 to 64X128
  - Upgrade current L/S-Band Transmit matrix from 48X96 to 64X128
  - Add X-Band Receive matrix – 24X40
  - Add X-Band Transmit matrix – 24X40
- RBU
  - L/S-Band Receive matrix – 24X72
  - L/S-Band Transmit matrix – 40X64
  - X-Band Receive matrix – 24x40
  - X-Band Transmit matrix – 24X40
- NSOF
  - L/S-Band Receive matrix – 16X24

All the following requirements shall be met from the input rack interface panel to the output rack interface panel, unless otherwise specified in the requirement statement.

2. Switching Matrix Hardware Specifications

2.1. Receive Intermediate Frequency Distribution Switching (RIFDS) Subsystem

Req. #	Req. Name	Requirement Description
2.1.1	Number of Inputs	24 minimum(RBU), 16 minimum(NSOF)
2.1.2	Number of Outputs	72 minimum(RBU), 24 minimum(NSOF)
2.1.3	Type of Switching	Non-Blocking – Any input to any output. Each input may be switched to any combination of the outputs simultaneously, without any loss. Only one input per output
2.1.4	Center Frequency	70 MHz
2.1.5	Switch Type	Solid State
2.1.6	1 dB Compression	Greater than +10 dBm output at any gain

	Point	
2.1.7	Isolation	Between any two inputs with all other inputs terminated in 50 Ohms: 70 dB minimum Between any undesired input and any output with all other ports terminated in 50 Ohms: 70 dB minimum Between any two outputs which are connected to a common input: 70 dB minimum
2.1.8	Impedance	50 Ohms nominal
2.1.9	Gain	Each input/output signal path shall be independently adjustable from 0 to + 10 dB with a step size no greater than 0.5 dB, measured at the Trumpeter output patch panel
2.1.10	Amplitude Flatness	Ripple within the 1 dB bandwidth shall be less than 1.0 dB peak to peak
2.1.11	Noise Figure	25 dB maximum
2.1.12	VSWR	Input: 1.2:1 Output: 1.5:1
2.1.13	Spurious Response	With two inputs each at -3 dBm and the switch set for unity gain, there shall be no spurious products at the output of the switch greater than -54 dBc
2.1.14	Stability	Unconditionally stable with source and load impedance from short to open and at all phase angles
2.1.15	Overload Protection	Shall be protected against permanent damage from the accidental application of a continuous signal at a level of +15 dBm for a period of one hour
2.1.16	Switching Time	Less than 50 milli-seconds
2.1.17	One dB bandwidth	Greater than 40 MHz:
2.1.18	Control & Monitor	Monitor & Control (M&C) shall exist over all functionality of the switch matrix. Shall include but not limited to Remote/local switching, hardware monitoring, power subsystem monitoring. These M&C points shall be available at all times and at all M&C interface points. Shall be controlled and monitored Remotely via the Control/Monitor front Panel and have RS-232 & 10/100BaseT (TCP/IP) interface for external computer control. Controlling command structure must be thoroughly documented and provided to NOAA, Alarm Message structure must be thoroughly documented
2.1.19	2.1.Power Supplies	Redundant Power Supplies, no single point of failure for the IFDS power system. Power supplies shall be real-time hot swappable or comparable technology. Status of the individual supplies shall be provided to the remote control systems and front panel monitors.
2.2.19.1	Power Failure	Following an interruption in primary power, the switches shall return to the configuration which existed prior to the interruption. Switches shall configure within one second of the power restoration.
2.1.20	Patch Panels	Input patch panel shall be provided for all input channels into the switch and an output patch panel shall be provided for all output channels from the switch. This configuration is intended to allow patching around the switch. Patch panels used shall be standard Trumpeter U Type patches All external antenna connectivity to the switching matrix input patch

		panel shall be provided by the vendor interface panel. All external ground system connectivity to the switching matrix output patch panel shall be provided by the vendor interface panel. Interface panel shall be located in the bottom of the vendor supplied racks. Connectors to the external side of the interface panel shall be TNC. Vendor shall perform all internal and external wiring .
2.1.21	Maintainability	Shall be designed so that a failure in a given signal path can be repaired in real-time without affecting any other signal path. This shall be true in terms of matrix input or output
2.1.22	Connector Type	The equipment side of the vendor interface panel shall be TNC. Switch side of interface panel is contractor TBD. Goal is to minimize intra-rack cable sizing, reduce cable congestion, facilitate better rack organization, and provide techs space to troubleshoot problems
2.1.23	Hardware Rack	Contractor shall propose a hardware rack configuration for their switch configuration. Contractor shall provide the rack. Government shall approve proposed rack

2.2. Transmit Intermediate Frequency Distribution Switching (TIFDS) Subsystem.

Req. #	Req. Name	Requirement Description
2.2.1	Number of Inputs	40 minimum(RBU)
2.2.2	Number of Outputs	64 minimum(RBU)
2.2.3	Type of Switching	Non-Blocking – Any input to any output. Each input may be switched to any combination of the outputs simultaneously without any loss Only one input per output
2.2.4	Center Frequency	70 MHz
2.2.5	Switch Type	Solid State
2.2.6	1 dB Compression Point	Greater than +10 dBm output at any gain
2.2.7	Isolation	Between any two inputs with all other inputs terminated in 50 Ohms: 70 dB minimum Between any undesired input and any output with all other ports terminated in 50 Ohms: 70 dB minimum Between any two outputs which are switched from a common input: 70 db minimum
2.2.8	Impedance	50 Ohms nominal
2.2.9	Amplitude Flatness	Ripple within the 1 dB bandwidth shall be less than 1.0 dB peak to peak
2.2.10	Noise Figure	25 dB maximum
2.2.11	VSWR	Input: 1.2:1 Output: 1.5:1
2.2.12	Spurious Response	With two inputs each at -3 dBm and the switch set for unity gain, there shall be no spurious products at the output of the switch greater than -54 dBc
2.2.13	Stability	Unconditionally stable with source and load impedance from short to open and at all phase angles
2.2.14	Overload Protection	Shall be protected against permanent damage from the accidental application of a continuous signal at a level of +15 dBm for a period of one hour
2.2.15	Switching Time	Less than 50 milli-seconds
2.2.16	One dB bandwidth	Greater than 40 MHz:
2.2.17	Control & Monitor	Monitor & Control (M&C) shall exist over all functionality of the

		switch matrix. Shall include but not limited to Remote/local switching, hardware monitoring, power subsystem monitoring Shall be controlled and monitored Remotely via the Control/Monitor front Panel and have RS-232 & 10/100BaseT (TCP/IP) interface for external computer control. Controlling command structure must be thoroughly documented and provided to NOAA. Alarm Message structure must be thoroughly documented
2.2.18	Power Supplies	Redundant Power Supplies, no single point of failure for the IFDS power system. Power supplies shall be hot swappable or comparable technology. Status of the individual supplies shall be provided to the remote control and monitor panel
2.2.18.1	Power Failure	Following an interruption in primary power, the switches shall return to the configuration which existed prior to the interruption. Switches shall configure within two seconds of the power restoration.
2.2.19	Patch Panels	Input patch panel shall be provided for all input channels into the switch and an output patch panel shall be provided for all output channels from the switch. This configuration is intended to allow patching around the switch. Patch panels used shall be standard Trumpeter U Type patches All external antenna connectivity to the switching matrix input patch panel shall be provided by the vendor interface panel. All external ground system connectivity to the switching matrix output patch panel shall be provided by the vendor interface panel. Interface panel shall be located in the bottom of the vendor supplied racks. Connectors to the external side of the interface panel shall be TNC. Vendor shall perform all internal and external wiring .
2.2.20	Maintainability	Shall be designed so that a failure in a given signal path can be repaired in real-time without affecting any other signal path. This shall be true in terms of matrix input or output
2.2.21	Connector Type	The equipment side of the vendor interface panel shall be TNC. Switch side of interface panel is contractor TBD. Goal is to minimize intra-rack cable sizing, reduce cable congestion, facilitate better rack organization, and provide techs space to troubleshoot problems
2.1.22	Hardware Rack	Contractor shall propose a hardware rack configuration for their switch configuration. Contractor shall provide the rack. Government shall approve proposed rack

2.3. Auxiliary Distribution Subsystem (ADS) L&S Band IF

Req. #	Req. Name	Requirement Description
2.3.1	General	Auxiliary Distribution Subsystem Shall consist of: ▪ Auxiliary Patch Panel ▪ Auxiliary Distribution Amplifiers ▪ Specification shall apply to the RBU & NSOF ADS
2.3.2	Auxiliary Patch Panel	4 Input Channels minimum 32 Output Channels minimum
2.3.3	Auxiliary Distribution Amplifiers	Number of Amps: 4 Inputs to each Amp: 1 Outputs from each Amp: 8

2.3.4	Center Frequency	70 MHz
2.3.5	1 dB Compression Point	Greater than +10 dBm output at any gain
2.3.6	Isolation	Between any two inputs with all other inputs terminated in 50 Ohms: 70 dB minimum Between any undesired input and any output with all other ports terminated in 50 Ohms: 70 dB minimum Between any two outputs which are switched from a common input: 70 db minimum
2.3.7	Impedance	50 Ohms nominal
2.3.8	Gain	Each input/output signal path shall be independently adjustable from 0 to + 10 dB with a step size no greater than 0.5 dB
2.3.9	Amplitude Flatness	Ripple within the 1 dB bandwidth shall be less than 1.0 dB peak to peak
2.3.10	Noise Figure	25 dB maximum
2.3.11	VSWR	Input: 1.2:1 Output: 1.5:1
2.3.12	Spurious Response	With two inputs each at -3 dBm and the switch set for unity gain, there shall be no spurious products at the output of the switch greater than -54 dBc
2.3.13	Stability	Unconditionally stable with source and load impedance from short to open and at all phase angles
2.3.14	Overload Protection	Shall be protected against permanent damage from the accidental application of a continuous signal at a level of +15 dBm for a period of one hour
2.3.15	One dB bandwidth	Greater than 50 MHz:
2.3.16	Intent of Aux System	Bypass a failed system by distributing the composite IF signal from each antenna
2.3.17	Connector Type	Shall be TNC

2.4. IF Distribution Controller Subsystem: Local Control Unit (LCU)

Req. #	Req. Name	Requirement Description
2.4.1	General	The IF Distribution Subsystem Controller shall allow complete control & monitoring of the following: ▪ RIFDS L/S & X ▪ TIFDS L/S & X ▪ Specification shall apply to the Wallops, RBU & NSOF ADS
2.4.2	Control Modes	The IFDS Controller shall be operable in any one of the following modes: ▪ Local Control ▪ Computer Control A switch/indicator shall be provided which shall allow selection of Local or Computer control. Local Mode locks out Remote Mode.
2.4.3	Local Control Mode	Local Control mode shall include a front panel keypad/touchpad and LCD/LED display. The local control panel shall allow the display of the status of all input and output switches for each IF distribution subsystem.

		The local control panel shall allow desired paths to be selected and displayed prior to the actual change in switch position.\ The local control panel shall display the status of all individual power supplies, combiners, amps, system gain, channel gain, CPUs, I/O cards, and switching chassis used in the IF Switching and Distribution Subsystem. Local control panels shall also provide I/O channel aliases, and privileged user logins. Local Control Mode shall at a minimum provide status messages relative to: switch states, switch changes and any anomalous subsystem situation to any externally connected computer system. Local Control shall at a minimum encompass all current functionality
2.4.4	Computer Control Mode	Computer Control mode shall include a RS-232 & a 10/100BaseT (TCP/IP) interface Shall provide a text based command structure for issued directives and received status. Shall provide text based status on all aspects of the IFDS subsystem. Shall include but is not limited to the following: RIFDS, TIFDS, individual switches, individual power supplies, power distribution unit local control units & ADS. Must provide at a minimum, current computer control capability.
2.4.5	Gain Control	Each input/output signal path shall be independently adjustable from 0 to + 10 dB with a step size no greater than 0.5 dB. (L&S Rx only) Gain control will be automatic based on the input/output patch selected
2.4.6	Select/Execute	Front Panel Control shall allow desired paths to be selected and displayed prior to the actual change in switch position. The switch position change shall be activated by a separate execute command. Status of this command execution shall be transmitted to any connected computer.
2.4.7	Status Availability	Status of the switches ,power supplies, combiners, amps, channel gain, CPUs, I/O cards, and switching chassis shall be available to the operator at all times at the Local Control and computer control location regardless of control position.
2.4.8	Power Supplies	Redundant power supplies shall be used so that no single failure will prevent full operation of switch subsystem. Power Supplies shall be hot swappable in real-time without affecting switching capabilities.
2.4.9	Controller Redundancy	A minimum of two redundant controllers shall be furnished for each IFDS subsystem (RIFDS, TIFDS) Each controller shall be fully operational and capable of tracking the switching configuration regardless of where the switch changes were initiated. Controllers shall provide overview configuration and status of the entire hardware system. Controllers shall display current switch configuration from a powered up state.
2.4.10	Hardware Expandability	No more that 40% of the available RAM, ROM and hard disk space will be used at the time of delivery of the subsystem. Shall provide sufficient flexibility to incorporate future switching matrices. Flexibility is defined as the controllers' ability to incorporate a

		new matrix into its M&C capabilities and make this functionality available to its local and remote users.

2.5. X-BAND Receive Intermediate Frequency Distribution Switching (XRIFDS) Subsystem

Req. #	Req. Name	Requirement Description
2.5.1	Number of Inputs	24 minimum(Wallops),24 minimum(RBU)
2.5.2	Number of Outputs	40 minimum(Wallops), 40 minimum(RBU)
2.5.3	Type of Switching	Non-Blocking – Any input to any output. Each input may be switched to any combination of the outputs simultaneously, without any loss. Only one input per output
2.5.3.1	Operational Band	1000 to 1400 MHz
2.5.4	Center Frequency	1200 MHz
2.5.5	Switch Type	Solid State
2.5.6	1 dB Compression Point	+8 dBm output power level
2.5.7	Isolation	Between any two inputs with all other inputs terminated in 50 Ohms: 70 dB minimum Between any undesired input and any output with all other ports terminated in 50 Ohms: 65 dB minimum Between any two outputs which are connected to a common input: 70 dB minimum
2.5.8	Impedance	50 Ohms nominal
2.5.9	Insertion Gain	0 ± 0.5 dB
2.5.10	Amplitude Flatness	Ripple within the 1 dB bandwidth shall be less than or equal to ± 0.5 dB
2.5.11	Noise Figure	27 dB maximum
2.5.11.1	Group Delay	
2.5.11.2	GD overany 60 MHz	850 pS
2.5.11.3	GD Variation of Operational BW	1.0 nS
2.5.12	VSWR	Input: 1.2:1 Output: 1.5:1
2.5.13	Spurious Response	With two inputs each at -10 dBm and the switch set for unity gain, there shall be no spurious products at the output of the switch greater than -54 dBc
2.5.14	Stability	Unconditionally stable with source and load impedance from short to open and at all phase angles
2.5.15	Overload Protection	Shall be protected against permanent damage from the accidental application of a continuous signal at a level of +18 dBm for a period of one hour
2.5.16	Switching Time	Less than 50 milli-seconds
2.5.17	One dB bandwidth	Greater than 400 MHz:
2.5.18	Control & Monitor	Monitor & Control (M&C) shall exist over all functionality of the switch matrix. Shall include but not limited to Remote/local switching, hardware monitoring, power subsystem monitoring. These M&C points shall be available at all times and at all M&C interface points. Shall be controlled and monitored Remotely via the Control/Monitor front Panel and have RS-232 & 10/100BaseT (TCP/IP) interface for

		external computer control. Controlling command structure must be thoroughly documented and provided to NOAA, Alarm Message structure must be thoroughly documented
2.5.19	2.5.Power Supplies	Redundant Power Supplies, no single point of failure for the IFDS power system. Power supplies shall be real-time hot swappable or comparable technology. Status of the individual supplies shall be provided to the remote control systems and front panel monitors.
2.5.19.1	Power Failure	Following an interruption in primary power, the switches shall return to the configuration which existed prior to the interruption. Switches shall configure within one second of the power restoration.
2.5.20	Patch Panels	Input patch panel shall be provided for all input channels into the switch and an output patch panel shall be provided for all output channels from the switch. This configuration is intended to allow patching around the switch. Patch panels used shall be standard Trumpeter U Type patches All external antenna connectivity to the switching matrix input patch panel shall be provided by the vendor interface panel. All external ground system connectivity to the switching matrix output patch panel shall be provided by the vendor interface panel. Interface panel shall be located in the bottom of the vendor supplied racks. Connectors to the external side of the interface panel shall be TNC. Vendor shall perform all internal and external wiring .
2.5.21	Maintainability	Shall be designed so that a failure in a given signal path can be repaired in real-time without affecting any other signal path. This shall be true in terms of matrix input or output
2.5.22	Connector Type	The equipment side of the vendor interface panel shall be TNC. Switch side of interface panel is contractor TBD. Goal is to minimize intra-rack cable sizing, reduce cable congestion, facilitate better rack organization, and provide techs space to troubleshoot problems
2.7.23	Cable loss	Shall be less than TBD dB per 100 foot. What does ETL use internal to the switching racks.
2.5.24	Hardware Rack	Contractor shall propose a hardware rack configuration for their switch configuration. Contractor shall provide the rack. Government shall approve proposed rack

2.6. X-BAND Transmit Intermediate Frequency Distribution Switching (XTIFDS) Subsystem.

Req. #	Req. Name	Requirement Description
2.6.1	Number of Inputs	24 minimum(Wallops), 24 minimum(RBU)
2.6.2	Number of Outputs	40 minimum(Wallops), 40 minimum(RBU)
2.6.3	Type of Switching	Non-Blocking – Any input to any output. Each input may be switched to any combination of the outputs simultaneously without any loss Only one input per output
2.6.3.1	Operational Band	1000 to 1400 MHz
2.6.4	Center Frequency	1200 MHz
2.6.5	Switch Type	Solid State
2.6.6	1 dB Compression Point	+8 dBm output power level

2.6.7	Isolation	Between any two inputs with all other inputs terminated in 50 Ohms: 70 dB minimum Between any undesired input and any output with all other ports terminated in 50 Ohms: 65 dB minimum Between any two outputs which are switched from a common input: 70 db minimum
2.6.8	Impedance	50 Ohms nominal
2.6.8.1	Insertion Gain	0 ± 0.5 dB
2.6.9	Amplitude Flatness	Ripple within the 1 dB bandwidth shall be less than or equal to ± 0.5 dB
2.6.10	Noise Figure	27 dB maximum
2.5.11.1	Group Delay	
2.5.11.2	GD overany 60 MHz	850 pS
2.5.11.3	GD Variation of Operational BW	1.0 nS
2.6.11	VSWR	Input: 1.2:1 Output: 1.5:1
2.6.12	Spurious Response	With two inputs each at -10 dBm and the switch set for unity gain, there shall be no spurious products at the output of the switch greater than -54 dBc
2.6.13	Stability	Unconditionally stable with source and load impedance from short to open and at all phase angles
2.6.14	Overload Protection	Shall be protected against permanent damage from the accidental application of a continuous signal at a level of +18 dBm for a period of one hour
2.6.15	Switching Time	Less than 50 milli-seconds
2.6.16	One dB bandwidth	Greater than 400 MHz:
2.6.17	Control & Monitor	Monitor & Control (M&C) shall exist over all functionality of the switch matrix. Shall include but not limited to Remote/local switching, hardware monitoring, power subsystem monitoring Shall be controlled and monitored Remotely via the Control/Monitor front Panel and have RS-232 & 10/100BaseT (TCP/IP) interface for external computer control. Controlling command structure must be thoroughly documented and provided to NOAA. Alarm Message structure must be thoroughly documented
2.6.18	Power Supplies	Redundant Power Supplies, no single point of failure for the IFDS power system. Power supplies shall be hot swappable or comparable technology. Status of the individual supplies shall be provided to the remote control and monitor panel
2.6.18.1	Power Failure	Following an interruption in primary power, the switches shall return to the configuration which existed prior to the interruption. Switches shall configure within two seconds of the power restoration.
2.6.19	Patch Panels	Input patch panel shall be provided for all input channels into the switch and an output patch panel shall be provided for all output channels from the switch. This configuration is intended to allow patching around the switch. Patch panels used shall be standard Trumpeter U Type patches

		All external antenna connectivity to the switching matrix input patch panel shall be provided by the vendor interface panel. All external ground system connectivity to the switching matrix output patch panel shall be provided by the vendor interface panel. Interface panel shall be located in the bottom of the vendor supplied racks. Connectors to the external side of the interface panel shall be TNC. Vendor shall perform all internal and external wiring .
2.6.20	Maintainability	Shall be designed so that a failure in a given signal path can be repaired in real-time without affecting any other signal path. This shall be true in terms of matrix input or output
2.6.21	Connector Type	The equipment side of the vendor interface panel shall be TNC. Switch side of interface panel is contractor TBD. Goal is to minimize intra-rack cable sizing, reduce cable congestion, facilitate better rack organization, and provide techs space to troubleshoot problems
2.6.22	Cable loss	Shall be less than TBD dB per 100 foot. What does ETL use internal to the switching racks.
2.6.23	Hardware Rack	Contractor shall propose a hardware rack configuration for their switch configuration. Contractor shall provide the rack. Government shall approve proposed rack

2.7. X-BAND Auxiliary Distribution Subsystem (XADS)

Req. #	Req. Name	Requirement Description
2.7.1	General	Auxiliary Distribution Subsystem Shall consist of: ▪ Auxiliary Patch Panel ▪ Auxiliary Distribution Amplifiers ▪ Specification shall apply to the Wallops & NSOF ADS
2.7.2	Auxiliary Patch Panel	4 Input Channels minimum 32 Output Channels minimum
2.7.3	Auxiliary Distribution Amplifiers	Number of Amps: 4 Inputs to each Amp: 1 Outputs from each Amp: 8
2.7.3.1	Operational Band	1000 to 1400 MHz
2.7.4	Center Frequency	1200 MHz
2.7.5	1 dB Compression Point	+8 dBm output power level
2.7.6	Isolation	Between any two inputs with all other inputs terminated in 50 Ohms: 70 dB minimum Between any undesired input and any output with all other ports terminated in 50 Ohms: 65 dB minimum Between any two outputs which are switched from a common input: 70 db minimum
2.7.7	Impedance	50 Ohms nominal
2.7.8	Gain	Each input/output signal path shall be independently adjustable from 0 to + 10 dB with a step size no greater than 0.5 dB
2.7.9	Amplitude Flatness	Ripple within the 1 dB bandwidth shall be less than or equal to ± 0.25 dB
2.7.10	Noise Figure	25 dB maximum
2.7.11.1	Group Delay	
2.7.11.2	GD over any 60	850 pS

	MHz	
2.7.11.3	GD Variation of Operational BW	1.0 nS
2.7.11	VSWR	Input: 1.2:1 Output: 1.5:1
2.7.12	Spurious Response	With two inputs each at -3 dBm and the switch set for unity gain, there shall be no spurious products at the output of the switch greater than -54 dBc
2.7.13	Stability	Unconditionally stable with source and load impedance from short to open and at all phase angles
2.7.14	Overload Protection	Shall be protected against permanent damage from the accidental application of a continuous signal at a level of +18 dBm for a period of one hour
2.7.15	One dB bandwidth	Greater than 400 MHz:
2.7.16	Intent of Aux System	Bypass a failed system by distributing the composite IF signal from each antenna
2.7.17	Connector Type	Shall be TNC

2.8 Wallops Upgrades
The upgrades to the Wallops IFDS system shall meet all requirements referenced in sections 2.1, 2.2, 2.4, 3.1, 3.2, excluding matrix size, and shall be fully compatible with the current Wallops IFDS hardware, firmware, and software monitor and control system.

3. Basic Software

The Basic Software shall provide graphical switching capability via a remote computer interface. This software shall be capable of displaying, monitoring, and controlling the configuration of both the RIFDS and TIFDS matrix switch configurations. Software shall provide graphical status of system health. Software shall be implemented on a rack-mount computer system.

3.1. Optional Software

Intermediate Frequency Distribution Software Switching System (IFDSSS)

The IFDSSS is the user interface to a graphical representation of the exiting switch matrices. It shall provide the user the ability to graphically monitor and control all LCU & switch functionality. It shall be implemented on a rack-mount computer now referred to as the IFDS Monitor & Control computer (IMCC). This system shall be developed in a commercial-off-the-shelf package, such as National Instruments LabView or the GE iFix product which easily lends its toolkits to development of such a software/hardware based system. Software shall be fully compatible with and supported by the hardware switch manufacture. The IFDSSS design shall:

a. Increase speed and reliability of the switching system under all situations, allowing signal flow and equipment configuration changes to be made quickly and with a higher degree of reliability.

b. Provide a user friendly interactive graphical user interface (GUI) for implementing switch changes, minimizing operator error when signal flow configuration changes need to be made. The GUI will allow personnel with a limited knowledge of the IFDS to make switching changes with a high degree of confidence. Government shall approve layout of GUI screens.

c. Provide a interactive GUI hardware block diagram which allows the user to drill down into the system.

The GUI and its associated drill down screens shall provide sufficient information as to allow troubleshooting of the IFDS hardware.

d. "Operational" switch shall be defined as the ground equipment currently being used to support an operational, stored, or mission of opportunity spacecraft.

e. IFDSSS shall monitor the operational switches and provide notice to the user if an operational switch change is issued. IFDSSS shall provide the user with the ability to either allow or deny the operational switch change.

f. IFDSSS shall facilitate operational transmit and receive ground equipment chains to be switched between antenna systems.

g. Establish continuous polling of all elements needed to monitor and control the IFDS systems by the IMCC. This includes but is not limited to power supplies, combiners, amplifiers, gain, CPUs, I/O cards and switching chasses.

h. The IMCC shall be connected to the station timing system to allow time stamping of all issued command switch directives, alarm conditions and any messaging which is captured in the events or alarm logs.

i. This software system shall be designed such that it can be easily maintained by Government staff. Modifications such as equipment location, equipment name changes, assigning equipment to exiting switches, port additions, etc, shall be accomplished without recompiling the code.

j. IFDSSS shall provide a mechanism which allows IFDS control by entities (GAMCATS) other than the local user and the IFDSSS user. This capability is intended to allow the GOES R program to systematically gain control of the matrix switching systems.

k. IFDSSS shall designate switch input and output ports as either "GOES R" or "Other" ports. Designation shall determine if GAMCATS has the authority to modify the switch configuration

l. In order to minimize switching complexity, the local switching software at each site shall provide the user with the same GUI screens, modified for matrix size, and software functionality

4. Integration Plan.

The contractor shall be responsible for providing the Government with a draft Integration Plan to substantiate the vendor's understanding of the process and risk mitigation required of this Statement of Work. The draft plan shall be provided with the quote (see Technical Approach of the RFQ). Upon award and approval of the Draft Plan the Final Integration Plan (FIP) shall be submitted and implemented.

5. Design Review.

The contractor shall perform a preliminary and critical design review for the government. These meetings shall include all relevant contractor personnel and associated documentation. The preliminary design review shall be held at the Wallops Command and Data Acquisitions Station in Wallops, Virginia. The Critical design review shall be held at the contractor's facility.

6. Testing

The contractor is required to perform the following tests: Factory Acceptance Testing and Final Acceptance testing. Each test shall be accompanied by an appropriate test plan. Test plans shall be submitted for Government review at least 7 days in advance of the testing. Signed copies of the completed test plan shall be provided to the Government. A government representative must witness each of the tests listed above. The contractor shall give no less than fourteen (14) calendar days advance notice of test date(s).

7. Training

Training shall include classroom and hands-on training geared to an audience of operators and technicians. Topics shall include both manual and remote operation of the system and troubleshooting techniques which help isolate possible problems. This training shall be held at the Wallop Station and shall be at least two days for a maximum of 12 students.

In addition to the aforementioned training, the contractor shall provide software maintenance training for the delivered software. The training shall be held at the Wallops Station for two students and shall be sufficient to cover the topic.

6. Comprehensive Data Package

The successful contractor shall provide comprehensive documentation about the delivered hardware and software systems. This documentation shall include but is not limited to the following: 1) Description of the as built configuration 2) Schematics 3) cabling diagrams 4) Operations 5) Maintenance 6) Theory of Operations 7) Software Description 8) Software/hardware Interface Control & Configuration 9) Troubleshooting guide 10) Table of Contents and 11) List of required Spare Parts needed to maintain the as built system. List shall include spare part name, quantity, part number, delivery lead time and unit price. The Data Package shall be provided three (3) hard copies and three (3) CDs.

Example of Compliance Matrix – To be Submitted with Vendor's Technical Solution For Technical Evaluation Purposes.

Requirements #	Requirement Description	Req. Meet? (Yes, No)	Loc in Proposal (Pg, Paragraph)	Comment
2.1.1	# of Inputs	Yes	12, 5.1.1	????
2.1.2	# Outputs	Yes	?????	????
……..	……..	……..	……..	……..
……..	……..	……..	……..	……..
……..	……..	……..	……..	……..
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